Claims

1) A method for the production of an aromatic fluorine-labelled compound comprising fluoridation of an iodonium salt with a fluoride ion source characterised in that the reaction mixture contains a free radical trap.

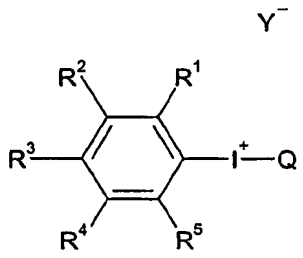
2) The method of claim 1 wherein the free radical trap is selected from 2,2,6,6-Tetramethylpiperidine-N-Oxide, 1,2-diphenylethylene, ascobate, para-amino benzoic acid, α-tocopherol, hydroquinone, di-t-butyl phenol, β-carotene and gentisic acid.

3) The method of either of claims 1 or 2 wherein the free radical trap is 2,2,6,6-Tetramethylpiperidine-N-Oxide or 1,2-diphenylethylene.

4) The method of any of claims 1-3 wherein the fluoride ion source is selected from potassium fluoride, caesium fluoride and tetraalkylammonium fluoride.

5) The method of claim 4 wherein the fluoride ion source is potassium fluoride and Kryptofix™ is used to activate the fluoride ion.

6) The method of any of claims 1-5 wherein the iodonium salt is of Formula I:



(I)

wherein:

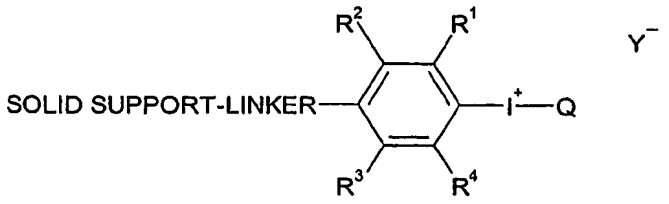
Q is a precursor of the fluorine-labelled compound ;

R^1-R^5 are independently selected from hydrogen, nitro, cyano, halogen, C_{1-10} hydroxyalkyl, C_{2-10} carboxyalkyl, C_{1-10} alkyl, C_{2-10} alkoxyalkyl, C_{1-10} hydroxyalkyl, C_{1-10} aminoalkyl, C_{1-10} haloalkyl, C_{6-14} aryl, C_{3-12} heteroaryl, C_{3-20} alkylaryl, C_{5-12} arylene, C_{2-10} alkenyl, C_{2-10} alkynyl, C_{1-10} acyl, C_{7-10} aroyl, C_{2-10} carboalkoxy, C_{2-10} carbamoyl, C_{2-10} carbamyl, or C_{1-10} alkysulphinyl, or protected versions of any of

these groups; or alternatively forms a four- to six-membered ring together with the R group to which it is adjacent, or protected versions thereof; and,

Y^- is an anion selected from triflate, nonaflate, mesylate and hexaflate.

7) The method of any of claims 1-5 wherein the iodonium salt is solid support-bound as in Formula II:



(II)

wherein:

Q is a precursor of the fluorine-labelled compound; and,

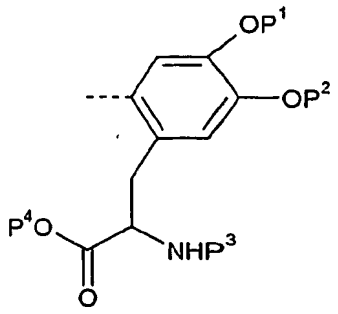
R^1-R^4 and Y^- are as defined for Formula I of claim 6.

8) The method of either of claims 6 or 7 wherein Q is an aryl group optionally substituted by 1 to 5 substituents independently selected from nitro, cyano, halogen, C_{1-10} hydroxyalkyl, C_{2-10} carboxyalkyl, C_{1-10} alkyl, C_{2-10} alkoxyalkyl, C_{1-10} hydroxyalkyl, C_{1-10} aminoalkyl, C_{1-10} haloalkyl, C_{6-14} aryl, C_{3-12} heteroaryl, C_{3-20} alkylaryl, C_{5-12} arylene, C_{2-10} alkenyl, C_{2-10} alkynyl, C_{1-10} acyl, C_{7-10} aroyl, C_{2-10} carboalkoxy, C_{2-10} carbamoyl, C_{2-10} carbamyl, or C_{1-10} alkysulphinyl, or protected versions of any of these groups; or alternatively forms a four- to six-membered ring together with the R group to which it is adjacent, or protected versions thereof.

9) The method of any of claims 1-8 wherein the fluorine-labelled compound is an [^{18}F]-labelled compound and the fluoride ion source is a source of $^{18}F^-$.

10) The method of claim 9 wherein the [^{18}F]-labelled compound is [^{18}F]-FDOPA.

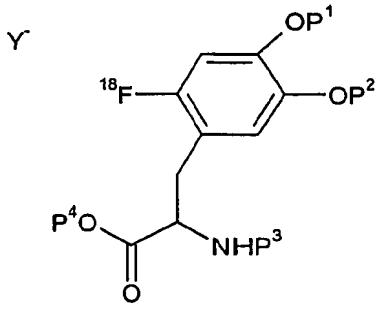
11) The method of any of claims 6-10 wherein the precursor is of Formula Ia:



(Ia)

wherein P^1, P^2, P^3, and P^4 are each independently hydrogen or a protecting group;

said method producing the labelled compound of Formula IIa:

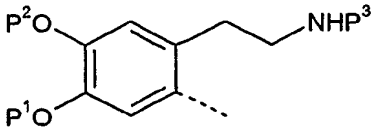


(IIa)

wherein P^1, P^2, P^3, and P^4 are each independently hydrogen or a protecting group and Y^- is an anion, preferably trifluoromethylsulphonate (triflate) anion.

12)The method of claim 9 wherein the [^{18}F]-labelled compound is [^{18}F]-dopamine.

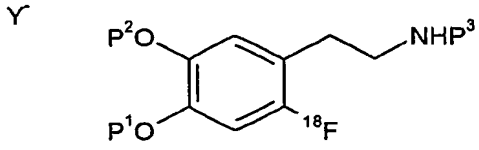
13)The method of any of claims 6-10 and 12 wherein the precursor is of Formula Ib:



(Ib)

wherein P^1, P^2, and P^3 are each independently hydrogen or a protecting group;

said method producing the labelled compound of Formula IIb:

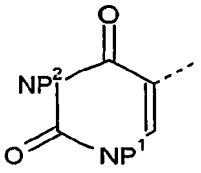


(IIb)

wherein P^1, P^2, and P^3 are each independently hydrogen or a protecting group and Y^- is an anion, preferably trifluoromethylsulphonate (triflate) anion.

14)The method of claim 9 wherein the [^{18}F]-labelled compound is [^{18}F]-uracil.

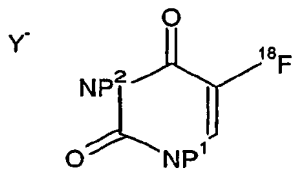
15)The method of any of claims 6-10 and 14 wherein the precursor is of Formula Ic:



Ic

wherein P^1 and P^2 are each independently hydrogen or a protecting group;

said method producing the labelled compound of Formula IIc:



IIc

wherein P^1 and P^2 are each independently hydrogen or a protecting group and Y^- is an anion, preferably trifluoromethylsulphonate (triflate) anion.

16)The method of any of claims 9-15, further comprising:

(i) removal of excess $^{18}F^-$, for example by ion-exchange chromatography; and/or

(ii) removal of the protecting groups; and/or

(iii) removal of organic solvent; and/or

(iv) formulation of the resultant compound as an aqueous solution.

17)An [^{18}F]-labelled compound produced by the method of any of claims 1-16.